



*Georgia State Financing and Investment Commission  
Procurement Services Department  
270 Washington Street SW, Second Floor  
Atlanta, GA 30334*

## **Audio Visual Systems Bid Package**

**Invitation to Bid  
Bid No. J-178  
Dalton State College  
Academic Building  
Dalton, GA**

**Mandatory Pre-Bid Meeting Date and Time: January 22, 2014 at 10:00 AM**

**Bid Opening Date and Time: February 5, 2014 at 2:00 PM**

## INVITATION TO BID

- A-1. Sealed bids on the following schedules Audio Visual Systems for "**PROJECT NO. J-178, Academic Building, Dalton State College, Dalton, Georgia**, will be received by the Georgia State Financing and Investment Commission, (Owner), at 270 Washington Street, Second Floor, Atlanta, Georgia 30334, until **2:00 P.M.** at the time legally prevailing in Atlanta, Georgia, on **February 5, 2014**. The bids will be opened and publicly read in Room 2104 at the above-mentioned address at 2:00 P.M. (If attending the bid opening, enter through Room 2101).
- A-2. The purpose of this Invitation to Bid is to obtain competitive bids for the outright purchase, delivery, and installation of Audio Visual Systems.
- A-3. Bidding documents are available on the Georgia Procurement Registry (see below) or may be obtained at the offices of the Georgia State Financing and Investment Commission, 270 Washington Street, Second Floor, Atlanta, Georgia 30334 or by contacting **Carol Ross** at **404-463-5739** or by email at [carol.ross@gsfic.ga.gov](mailto:carol.ross@gsfic.ga.gov). The GSFIC reserves the right to reject any proposal for violation of this provision. No questions other than written will be accepted, and no response other than written will be binding upon the GSFIC. All questions regarding this ITB must be submitted to:
- A-4. Questions about any aspect of the bid package shall be submitted in writing to Carol Ross at [carol.ross@gsfic.ga.gov](mailto:carol.ross@gsfic.ga.gov). The **deadline for submission of questions relating to this bid is noon, January 28, 2014**. All official answers to questions received shall be posted on the State Procurement Registry website [https://ssl.doas.state.ga.us/PRSapp/PR\\_index.jsp](https://ssl.doas.state.ga.us/PRSapp/PR_index.jsp). From the issue date of this solicitation until bids are publicly announced, bidders are not allowed to communicate about this solicitation for any reason with any employees or representatives of the State of Georgia except for submission of questions as instructed herein. For violation of this provision, GSFIC reserves the right to reject the bid of the offending respondent. Additional information posted regarding the project may be viewed by visiting the State Purchasing Georgia Procurement Registry website at [https://ssl.doas.state.ga.us/PRSapp/PR\\_index.jsp](https://ssl.doas.state.ga.us/PRSapp/PR_index.jsp). Upon reaching the Georgia Procurement Registry Search Engine site, under "Government Type" select State Government, then under "State Agencies" choose Georgia State Financing and Investment Commission and search for this solicitation. **Bidders should check the web site frequently for updates, addenda, instruction and any other additional information.**
- A-5. **MANDATORY PRE-BID CONFERENCE** will be held beginning at **Dalton State College (jobsite) on January 22, 2014 at 10:00 am**. The GSFIC reserves the right to disqualify a potential bidder due to a failure by the bidder to arrive for the site visit by the scheduled time. Failure to attend a mandatory site visit will automatically result in disqualification from the bid process.
- A-6. Bids must be accompanied by a bid bond (in lieu of the bid bond, GSFIC will accept a cashier's check, certified checks, money orders, etc.) in an amount not less than five (5%) of the base bid(s) drawn in favor of the Owner as a guarantee that the bid will not be withdrawn within sixty (60) days after time has been called on the date of opening.
- A-7. The Owner reserves the right to reject any or all bids and to waive technicalities and informalities.

- A-8. All expenses for preparing and submitting responses are the sole responsibility of the party submitting the response. GSFIC is not obligated to any party to reimburse such expenses. All submittals upon receipt become the property of GSFIC. Labeling information provided in submittals "proprietary" or "confidential," or any other designation of restricted use will not protect the information from public view. Subject to the provisions of the Open Records Act, the details of the bid documents will remain confidential until final award.
- A-9. All equipment must be installed in the spaces designated in the specifications ready for use.

**INSTRUCTION TO BIDDERS****INDEX**

- I. General
- II. Interpretation
- III. Submission of Bids
- IV. Subcontractor Listing
- V. Bases of Bid
- VI. Commencement and Completion
- VII. Bond Requirements

I. General

- A. Before submitting a bid, the Bidder shall examine all of the Contract Documents encompassed by the specifications and drawings. The successful Bidder will be required to do all work which is shown on the drawings, mentioned in the specifications or reasonably implied as necessary to complete the contract for this project.
- B. The Bidder is required to visit and examine the site to become acquainted with the adjacent areas, means of approach to the site, conditions of actual job site, and facilities for delivering, storing, placing, and handling of materials and equipment.
- C. Failure to visit the site or failure to examine any and all Contract Documents will in no way relieve the successful Bidder from necessity of furnishing any materials or equipment, or performing any work, that may be required to complete the work in accordance with the Contract Documents. Neglect of above requirements will not be accepted as reason for delay in the work or additional compensation.
- D. The Owner reserves the right to waive all formal bidding procedure.
- E. The decision of the Owner and Consultant as to the qualifications of an A/V Contractor to successfully furnish, complete, and maintain the systems described herein, shall be final.

II. INTERPRETATION

- A. No verbal explanation or instructions will be given in regard to the meaning of the drawings or specifications during the bid period. Bidders shall bring inadequacies, omissions or conflicts to the attention of Waveguide Consulting, Inc. (the Consultant) least seven (7) days before the date set for bid opening or due date for bids. Prompt clarification will be supplied to all bidders of record by addendum.
- B. Failure to so request clarification or interpretation of the drawings and specifications will not relieve the successful Bidder of responsibility. Signing of the contract will be considered as implicitly denoting that the Contractor has a thorough understanding of the scope of work and comprehension of the Contract Documents.

III. SUBMISSION OF BIDS

- A. All bids shall be submitted on the Bid Form bound herein and only bids which are made on this Bid Form will be considered. The entire Bid Form shall be removed from the specifications, filled out, and submitted in the manner specified hereinafter.
  - 1. Specifications shall not accompany bid.
  - 2. An itemized equipment list, similar to the list provided in the specifications, shall be included.
  - 3. Unit prices (without installation labor) are required for the purpose of future change order pricing and shall be included.
  - 4. Completed Qualification Forms shall be included
- B. Bid amounts shall be inserted in words and in figures in spaces provided on the Bid Form. In case of conflict, written word amounts will govern.
- C. Any addendum issued during the time of bidding shall become part of the Contract Document. Bidders shall acknowledge receipt of such addendum in the appropriate space provided in the Bid Form. Bid will be rejected if receipt of an addendum applicable to the award of contract has not been acknowledged on the Bid Form.
- D. Bidder shall be responsible for the sealed bid being delivered to the place designated for bid opening on or before the date and time specified. Bids received after time of closing will be rejected and returned to Bidder unopened.
- E. Bid will be considered invalid and will be rejected if it has not been signed by the Bidder.

**IV. SUBCONTRACTOR LISTING**

- A. A list of subcontractor, if any, must be submitted with the bid.
- B. Include company names, addresses, telephone numbers, and subcontract area of responsibility of each subcontractor.

**V. BASIS OF BID**

- A. Audiovisual work shall be performed per specifications, applicable provisions of the General Contract Document for this project and related drawings and specifications.

**VI. COMMENCEMENT AND COMPLETION**

- A. The successful Bidder will be notified in writing of the acceptance of this proposal and agrees to execute a Contract Construction Agreement for the work at the above state compensation within eight (8) calendar days of the notice. The format of the contract will be determined by Georgia State Financing and Investment Commission. The contractual agreement shall be with the Georgia State Financing and Investment Commission.
- B. The successful Bidder must provide proof of the following types of insurance to Georgia State Financing and Investment Commission, prior to commencing any work.
  - 1. Contractor's Liability Insurance
  - 2. Workmen's Compensation Insurance

**VII. BOND REQUIREMENTS**

- A. A Bid Bond in the amount of five percent (5%) of project cost is required. The Bidder shall secure bond and provide proof of bonding for this project.
- B. Provide cost of Bid Bond in space provided on the Bid Form. Do not include the bond cost in the Base Bid amount.
- C. A Performance Bond in the amount of one hundred percent (100%) of project cost is required. The Bidders shall secure bond and provide proof of bonding on this project.
- D. Provide cost of Bid Bond in space provided on the Bid Form. Do not include the bond cost in the Base Bid amount.

**BID FORM**

Dalton State College  
Academic Building  
650 College Drive  
Dalton, GA 30720

BID DUE DATE: \_\_\_\_\_ at \_\_\_\_\_

TO:  
Georgia State Financing and Investment Commission  
270 Washington Street, Suite 2104  
Atlanta, GA 30334

We \_\_\_\_\_

of \_\_\_\_\_

Street	City	County	State	Zip
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hereby agree to execute the proposed contract and to provide all labor and material required for the construction of the project designated above, for the prices hereinafter set forth, in strict accordance with the Contract Documents.

**AUDIOVISUAL SYSTEMS**

TOTAL A/V Systems Base Bid excluding bond \$

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Dollars

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TOTAL Bid Bond \$

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Dollars

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TOTAL Performance Bond \$

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Dollars

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**COMMENCEMENT AND COMPLETION OF CONTRACT WORK**

The undersigned agrees, if awarded the contract, to commence the Contract work on or before a date to be specified in a written Notice to Proceed or Contract, and to complete the work within the time stated in the Division 11130 Section 1.11 Scheduling.

**ADDENDUM RECEIPT**

We acknowledge receipt of the following Addenda (attach additional sheet if needed):

Addendum No. \_\_\_\_\_ Date \_\_\_\_\_

Addendum No. \_\_\_\_\_ Date \_\_\_\_\_

Addendum No. \_\_\_\_\_ Date \_\_\_\_\_

By signing this bid form, such action certifies that the Bidder has personal knowledge of the following:

- A. That said Bidder has examined the drawings and specifications, carefully prepared the bid form, and has checked the same in detail before submitting said bid; and that said bidder, or the agents, officers, or employees thereof, have not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding in connection with this bid.
- B. That all of said work will be performed at the Bidder's own proper cost and expense, that the Bidder will furnish all necessary materials, labor, tools, machinery, apparatus, and other means

of construction in the manner provided in the applicable specifications, and at the time stated in the contract.

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(Firm Name)  
(Seal, if bid is by a corporation)

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(Area Code & Telephone Number)

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(Signature of Bidder)

## **STATEMENT OF QUALIFICATIONS**

AV Integrators who are bidding the Valdosta State University Health Science and Business Administration Center should complete this Statement of Qualifications and return to

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### **PART 1 - ORGANIZATION**

Name of Company \_\_\_\_\_

Business Address \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Telephone Number \_\_\_\_\_

Plan of Organization  
(Proprietorship, Partnership, Corp.) \_\_\_\_\_

Year Organized \_\_\_\_\_

Number of years engaged in this business under the present name: \_\_\_\_\_

If now or formerly under another business name, supply details: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

List names, addresses, phone numbers and email addresses of the company's chief executive officer (CEO), chief financial officer (CFO) and, if appropriate, other LLC principals.

CEO

Name: \_\_\_\_\_ Phone: \_\_\_\_\_

Address: \_\_\_\_\_

Email: \_\_\_\_\_

CFO

Name: \_\_\_\_\_ Phone: \_\_\_\_\_

Address: \_\_\_\_\_

Email: \_\_\_\_\_

Other  
Principal

Name: \_\_\_\_\_ Phone: \_\_\_\_\_

Address: \_\_\_\_\_

Email: \_\_\_\_\_

Other  
Principal

Name: \_\_\_\_\_ Phone: \_\_\_\_\_

Address: \_\_\_\_\_

Email: \_\_\_\_\_

List Project Manager or Sales Representative phone number and email: Name: Phone:

Email: \_\_\_\_\_

Quotation Department Phone Number: \_\_\_\_\_

Accounts Receivable Phone Number: \_\_\_\_\_

DUNS Number: \_\_\_\_\_

**PART 2 - FINANCIAL**

Contracts now in hand (Gross Amount): \_\_\_\_\_

Total dollar value in AV integration projects your firm completed in the last five years:

2012	2011	2010	2009	2008
_____	_____	_____	_____	_____

Maximum Bonding Capacity: \_\_\_\_\_

Bonding Capacity Remaining if Awarded This Contract : \_\_\_\_\_

Name of submitting Integrator's Surety (Important Note: Surety must be authorized to transact business in the State of Georgia and must appear in the U.S. Treasury Department's most current Circular 570, as amended):  
\_\_\_\_\_  
\_\_\_\_\_

*Attach hereto a letter from the above-listed Surety containing a statement indicating the prospective Integrator's total bonding capacity, current bonding liability and currently available bonding capacity.*

List banks and phone numbers with which your firm does business. Do you grant permission to a responsible University of Tennessee agent to contact these banks?

Yes No

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No financial statements are required to be submitted with your qualifications package. However, prior to an award, the Owner may request financial statements from your firm, credit reports and letters from your bank and suppliers. If requested, and your firm does not comply with the request, this may be grounds for rejection of your bid.

Financial statements are considered confidential and, as such, will be destroyed when said documents are no longer required.

**PART 3 - COMPANY CREDENTIALS**

Integrator's primary business is audiovisual system contracting?  Yes  No

Integrator has an in-house AV system installation department staffed with full-time employees of the Integrator?  Yes  No

*Submitting organization's primary business must be audiovisual integration*

Does your company have appropriate business and contractor licenses? List with license numbers (Low Voltage, General Contractor, State Registration, etc.)

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*Submitting organization's primary business must be have the appropriate business and contractor's license at the time of bid.*

Identify current Audiovisual Solutions Provider (AVSP) certification level as issued by Info Comm International (Attach Documentation):

None       Sapphire       Emerald       Diamond

List any other company

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**PART 4 - EMPLOYEE CREDENTIALS**

Total Staff Size:			Total # of Offices:			
Total Staff Directly Involved with or supporting AV Work:						
AV Staff Breakdown	Project Management:		Control Sys. Programming:		Installation:	
	Engineering:		Sales:		Service:	
Other:						

Identify current number of CTS, CTS-I, and CTS-D accredited employees, as issued by InfoComm International:

CTS:		CTS-I:		CTS-D:	
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List any other employee accreditations  
(NICET, RCDD, AMX or Crestron Certified Programmer, etc.)


List the key personnel of this business proposed to, or likely to, work on this project including Project Manager, Project Engineer, Lead Installer, Lead Software Programmer or Assistant Programmer and other prominent field crew and office personnel.  
***Attach brief resumes of all listed personnel, complete with qualifications and construction experience.***

<u>Name</u> <u>Email and Phone</u>	<u>Position</u>
	Project Manager
	Project Engineer



**PART 5 - PROJECTS**

The AV Integrator shall list three completed projects during the last five years which consist of AV installations for which the Integrator was the primary contract holder, and for which the total AV project budget for each exceeded \$500,000.

**Project #1**

Name: \_\_\_\_\_

Address: \_\_\_\_\_  
\_\_\_\_\_

Name of Primary Contact: \_\_\_\_\_

Telephone Number: \_\_\_\_\_ Completion Date: \_\_\_\_\_

Design Consultant: \_\_\_\_\_

Contract Amount: \_\_\_\_\_ Change Order  
Amount: \_\_\_\_\_

Project Manager: \_\_\_\_\_

Project Engineer: \_\_\_\_\_

Lead Installer: \_\_\_\_\_

Lead Software Programmer: \_\_\_\_\_

Project Description: \_\_\_\_\_  
\_\_\_\_\_Was the project completed on time?  Yes  No If not, please explain  
\_\_\_\_\_

\_\_\_\_\_

**Project #2**

Name: \_\_\_\_\_

Address: \_\_\_\_\_  
\_\_\_\_\_

Name of Primary Contact: \_\_\_\_\_

Telephone Number: \_\_\_\_\_ Completion Date: \_\_\_\_\_

Design Consultant: \_\_\_\_\_

Contract Amount: \_\_\_\_\_ Change Order  
Amount: \_\_\_\_\_

Project Manager: \_\_\_\_\_

Project Engineer: \_\_\_\_\_

Lead Installer: \_\_\_\_\_

Lead Software Programmer: \_\_\_\_\_

Project Description: \_\_\_\_\_  
\_\_\_\_\_

Was the project complete

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**Project #3**

Name: \_\_\_\_\_

Address: \_\_\_\_\_  
\_\_\_\_\_

Name of Primary Contact: \_\_\_\_\_

Telephone Number: \_\_\_\_\_ Completion Date: \_\_\_\_\_

Design Consultant: \_\_\_\_\_

Contract Amount: \_\_\_\_\_ Change Order  
Amount: \_\_\_\_\_

Project Manager: \_\_\_\_\_

Project Engineer: \_\_\_\_\_

Lead Installer: \_\_\_\_\_

Lead Software Programmer: \_\_\_\_\_

Project Description: \_\_\_\_\_  
\_\_\_\_\_

Was the project complete

**PART 6 - LEGAL**

In the last five years, please list any bankruptcy or other insolvency proceedings in which your company, predecessor company(s), subsidiary company(s) or any of the principals thereof may have been involved. Include:

- Case name and number.
- Name of the court in which case was filed.
- Outcome of case; any appeals; and outcome of any appeals.

Remarks: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

For the last three years, please list for any contract-related litigation (including but not limited to litigation related to lien claims) to which your company, predecessor company(s), subsidiary company(s) or any of the principals thereof has been a party, the following information: (Attach additional pages if necessary). Include:

- Name of case, and case number.
- Name of court in which case was filed.
- Whether your company or principal was a named plaintiff or defendant.
- Description of claims made in case.
- Outcome of case; any appeals; and outcome of any appeals. Remarks: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

For the last 12 months, please list all vendors, manufacturers or sub-contractors that have placed your company, predecessor company(s), subsidiary company(s) or any of the principals thereof, on credit hold and/or have otherwise refused to sell, consign, deliver, loan or otherwise provide equipment and/or services. Include:

- Vendor name, contact name and phone number.
- Length of credit hold.
- Amount of outstanding credit at time of issuance of credit hold
- Current status

Remarks:

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**PART 7 - GOVERNMENT CRITERIA**AA/EEO Employer?  Yes  No

Does your Concern meet any of the following US Government criteria?

a. \_\_\_\_\_ Minority Enterprise Concern. A minority enterprise is one that is at least fifty percent owned by minority group members, or in the case of publicly owned businesses at least fifty-one percent of the stock is owned by minority group members. (If checked, indicate ethnic group below.)

\_\_\_\_\_ Black American (not of Hispanic origin) \_\_\_\_\_ Asian American

\_\_\_\_\_ American Indian/Alaskan Native \_\_\_\_\_ Hispanic American

b. \_\_\_\_\_ Women Owned and Operated Concern. A business that, regardless of ethnic background, is at least fifty percent owned by women members, or in the case of publicly- owned businesses at least fifty-one percent of the stock is owned by women.

c. \_\_\_\_\_ Small Business Concern. A business independently owned and operated, not dominant in its field and meets employment and/or sales standards developed by the Small Business Administration.

d. \_\_\_\_\_ Labor Surplus Area Concern. A business located in an area (designated by the US Government, Department of Labor) in which unemployment exceeds the national average.

**PART 8 - SIGNATURE**

**DEBARMENT:** The firm certifies, by submitting this Statement of Qualifications, that neither it nor its principals are presently debarred, suspended, proposed for debarment, have been declared ineligible, or voluntarily excluded from participation in this transaction (contract) by any governmental department or agency. If the firm cannot certify this statement, attach a written explanation for review by the Georgia State Financing and Investment Commission.

I hereby certify the above information to be correct and authorize the Georgia State Financing and Investment Commission to investigate all facts contained therein, including facility visitation.

Dated at \_\_\_\_\_ this \_\_\_\_\_ day of \_\_\_\_\_, \_\_\_\_\_.

\_\_\_\_\_  
Name of Organization

By: \_\_\_\_\_

Title: \_\_\_\_\_

State of \_\_\_\_\_

County of \_\_\_\_\_

\_\_\_\_\_, being duly sworn, deposes and says that he is  
\_\_\_\_\_  
(Title) of \_\_\_\_\_ and that the answers to the  
\_\_\_\_\_  
(Name of Organization)

foregoing questions and all statements contained therein are true and correct.

Sworn to before me this \_\_\_\_\_ day of \_\_\_\_\_, \_\_\_\_\_.

\_\_\_\_\_  
Notary Public

My commission expires \_\_\_\_\_.

**SECTION 27 4000****AUDIO VISUAL SYSTEMS****PART 1 – GENERAL****1.1 DESCRIPTION**

- A. The work required under this section of the specifications consists of the furnishing, installation, and programming of independent audio visual systems on the Dalton State College Academic Building in Dalton, Georgia. Reference floor plan drawings for audio visual equipment locations. In addition to all audio visual components, the contractor shall be required provide coordination with the data infrastructure systems and cable television systems. Also the contractor shall coordinate with the electrical contractors for all raceway to support the audio visual systems.
- B. The audio visual scope of work will require the contractor to provide a complete, quality operating system which will display, playback, and route computer, video, and audio signals as well as control signals to each noted space of the building. A factory-approved representative shall complete all system connections. A factory approved and factory trained representative of the contractor shall complete all onsite programming of equipment
- C. The contractor shall provide all labor, materials, equipment, and supervision to install specified systems. The installation, testing, and commissioning of all equipment shall be the full responsibility of the audio visual contractor for this project.

**1.2 QUALITY CRITERIA AND STANDARDS**

- A. All audio visual wiring, devices, and equipment shall comply with applicable UL, NEC, and NEMA code standards. All audio visual equipment shall be UL-listed and labeled.
- B. Audio visual wiring systems shall conform to established trade and industry standards. The following specifications and standards are incorporated into and become a part of this Specification by reference.
  1. AES14-1992 (r2004): – AES Standard for Professional Audio Equipment.
  2. AES26-2001 – AES Recommended Practice for Professional Audio
  3. ICEA S-80-576 ICEA Standard for Communications Wire and Cable for Wiring of Premises
  4. NFPA 70 National Electric Code
  5. UL 50 Enclosures for Electrical Equipment
- C. Installer's Qualifications:

1. Firm with at least 3 years of successful application, installation, and testing experience on specified systems and equipment.
2. The Contractor must show proof of being in the audio visual trade for a minimum of three years and provide three (3) references with contact names and telephone numbers regarding successful completion of audio visual projects of similar scope and size.
3. All supervisors and installers assigned to the installation of this system or any of its components shall have factory certification from each equipment manufacturer that they are qualified to install and test the provided products. Unqualified staff shall not be used for the installation of the equipment, system cables, and associated hardware.
4. All installers assigned to the installation of this system or any of its components shall have a minimum of 3 years' experience in the installation of the specified audio visual equipment and components.

### 1.3 SUBMITTALS

- A. Product Data: Audio Visual contractor shall provide a numbered equipment list of the systems devices he is providing. The list shall include quantity of items, manufacturer's product number, description of item and audio visual specification that it represents. Submit manufacturer's technical product technical data sheet for each item of systems equipment in order of the numbered equipment list. Submittal shall include drawings that contain complete floor plans and reflected ceiling plans, wiring and schematic diagrams and other details required to demonstrate that the system has been coordinated and will function as a complete system. Drawings shall include vertical riser diagrams, equipment rack details, elevation drawings, connector faceplate details, sizes, and type of all cables and raceway.
- B. Test Plan: Contractor shall submit a test plan that defines the tests required to ensure that the system meets technical, operational, and performance specifications, 45 days prior to the proposed test date. The test plan must be approved before the start of any testing. The test plan shall identify the capabilities and functions to be tested, and include detailed instructions for the setup and execution of each test and procedures for evaluation and documentation of the results.
- C. Manufacturer Certification: Submit a letter from the manufacturer's representative stating the proposed systems being submitted for review are in accordance with the recommendations of the manufacturer.

### 1.4 WARRANTY

- A. All equipment shall be new and shall be under warranty for a period of one (1) year, from the date of acceptance by the owner, against defects in equipment or workmanship. Failed equipment shall be replaced by the contractor at no cost to the owner. Owner's personnel may perform initial trouble investigation but replacement of failed equipment and escalated problem support will be handled by the contractor.

**1.5 ACCEPTABLE MANUFACTURERS**

- A. Reference Part 2 - Products Section of the specification for complete list of acceptable manufacturers.

**1.6 RECORD DRAWINGS**

- A. At the time of final inspection, provide three (3) sets of complete data on Audio visual System equipment used in this project. This data shall be in bound form and shall include all shop drawings required for this project.
- B. All record drawings shall include "as built" system interconnection diagrams with major components identified and number and type of interconnecting conductors.
- C. Maintenance and operating instructions on all systems.
- D. Certification from system manufacturers that systems are installed in accordance with manufacturer's recommendations and are functioning correctly at the time of final inspection.
- E. As-built drawings to show raceway layout and wiring for all systems.
- F. Corrected point-to-point drawings for all systems with color code to show the actual as-built condition.

**PART 2 - PRODUCTS****2.1 GENERAL MATERIALS REQUIREMENTS**

- A. Provide all materials under this section of the specifications. Materials and equipment shall be the manufacturers' latest standard design that has been in satisfactory use for at least 1 year prior to installation. See Part 3 - Execution specification section for additional product requirements.

**2.2 VIDEO PROJECTOR – LCD**

- A. The video projector shall be mounted as indicated in contract drawings. Audio visual contractor to provide mounting hardware and submit design for approval by a structural engineer. Audio Visual contractor shall provide appropriate projector lens for throw distance for the full coverage of the viewing area of projection screen provided. Audio visual contractor shall provide projector-monitoring software and coordinate monitoring systems requirements including IP network connections with owner.
- B. Video projector requirements shall include:

1. Projection System: 3LCD
2. Brightness: 4500 lumens
3. Pixel Number 2,304,000 pixel x 3 LCDs (1920 x 1200)
4. Native Resolution: WUXGA (1920 x 1200)
5. Aspect Ratio: Supports 16:10, 4:3, 16:9
6. Projection Lens Type: Manual focus/zoom
7. F-number: 1.65 – 2.55 (standard lens)
8. Zoom Ratio: Optical zoom 1.0 – 1.8
9. Lens Shift:
  - a. Vertical:  $\pm 67$  degrees
  - b. Horizontal:  $\pm 30$  degrees
10. Contrast Ratio
  - a. Up to 5000:1
11. Dimensions WxDxH (with standard lens): 19.88" x 6.73" x 15.94"
12. Weight: 21.5 lb.
13. Input Signal: NTSC/NTSC4.43/PAL/M-PAL/N-PAL/PAL60/SECAM/480i/576i/480p/576p/720p/1080i/1080p.
14. Interface Connections
  - a. HDMI x1
  - b. DisplayPort x1
  - c. Computer: D-sub HD 15-pin x2
  - d. Video-1: 5-BNC x1
  - e. Video-2: RCA x1
  - f. Composite Video: BNC x1
  - g. S-video: Mini DIN x1
  - h. Audio in: RCA (L & R) x1
  - i. Audio in: Mini stereo x3
  - j. Network: RJ-45 x 1, 100 Mbps
  - k. USB Type-A x1; Type-B x1
  - l. Serial: RS-232c x1
  - m. Hardwire remote jack x1
  - n. Monitor-Out: D-sub 15-pin x1

C. Acceptable Manufacturers: EPSON G6450WU or comparable by Panasonic, NEC, Christie or Optima.

### 2.3 VIDEO PROJECTOR POLE MOUNT

A. The video projector mount shall be mounted as indicated in contract drawings. Audio visual contractor to provide mounting hardware and submit design for approval by a structural engineer. Audio Visual contractor shall provide mounting bracket above projector for HDMI receiver and receiver power supply.

1. Type: Ceiling mount for LCD projectors consisting of two-piece telescoping column and hanging bracket.
2. Designed to accommodate LCD projector type.

3. Maximum load capacity: Minimum 35 pounds or as per projector manufacturers recommendations for the weight loading of the projector.
4. Telescoping support column: Extruded aluminum tubular sections with silver finish and top steel attachment plates.
  - a. Provide channels on outer column for cable management. Video cables to be retained in channel and concealed with press-in molding.
  - b. Inner column shall have positive safety stop to prevent separation from outer column.
  - c. Extension capability measured from ceiling to projector top.
5. Column adjustment at ceiling bracket:
  - a. Pitch: Plus and minus 30 degrees.
6. Projector bracket adjustment:
  - a. Roll and pitch: Plus and minus 30 degrees.
  - b. Yaw: 360 degrees.

B. Acceptable Manufacturers:

1. Premier
2. Chief
3. Extron

#### 2.4 PROJECTION SCREEN (PROVIDED / INSTALLED BY GENERAL CONTRACTOR)

- A. The projection screens are provided Audio Visual contractor shall be responsible for coordination of screen sizing aspect ratio with projector system provided. The projection screens and masking material shall be sized to accommodate the maximum ceiling height as for each room as indicated in contract drawings. Audio Visual contractor to coordinate mounting hardware and provide control programming for Up/Down control. The projection screens and masking material shall be sized to accommodate the maximum ceiling height for each room as indicated in contract drawings. Audio Visual contractor shall coordinate mounting with provided projector's throw distance for proper coverage of screen viewing area.
- B. Audio Visual contractor shall provide appropriate projector lens for throw distance for the projection screen provided. Audio Visual contractor to provide mounting hardware and submit design for approval by a structural engineer. Up/Down control switch shall be a product of the screen manufacturer.
- C. The projection screen shall be a recessed ceiling mount type. Height of viewing surface shall remain constant. Both projection screen and masking system shall be independently controlled, each using any standard or optional control. It shall be shall be electrically operated motor that operates at 120 volt AC. The quick reversal motor to have ball bearing and be oiled for life, with automatic thermal overload cutout and integral interlocking gears. It shall have pre-set but adjustable limit switches to automatically stop screen fabric in the "up" and "down" position. Stop action to be positive to prevent coasting. The rigid metal roller shall be at least 3" in diameter and shall be mounted on two heavy-duty brackets equipped with self-aligning bearings. Screen surface to be flame retardant and mildew resistant, Matte White, with black masking borders standard. Case to be of wood, with double top Motor compartment to be metal lined. Case to be finished with a primer coat, ready to accept final finish. Heavy metal brackets

shall be supplied for mounting screen into ceiling. The motor to be complete with 3-position control switch in box with cover plate. Screen to be listed by Underwriters' Laboratories and CSA.

D. Acceptable Manufacturers:

1. Draper Inc.
2. Da-Lite

2.7 FIFTY-FIVE INCH FLAT PANEL DISPLAY SCREEN (55" LCD, MEETING ROOM)

A. The LCD Screen shall be mounted as indicated in contract drawings. Audio Visual contractor to coordinate screen mounting requirements with General Contractor. Audio visual contractor to provide mounting hardware as per manufactures recommendation. Contractors to ensure that wall surface will accommodate Display weight and installation requirements. Display to be rated for commercial use. Provide external speaker kit for locations indicated.

B. Display specifications of equipment shall include:

1. Video
  - a. Screen Size: Diagonal length of TV screen 55". Class (54.6 inch diagonal)
  - b. Native Resolution 1920 X 1080 Progressive Scan
  - c. Dynamic Contrast Ratio: 3,000:1 minimum.
  - d. Aspect Ratio 16 X9.
  - e. Refresh Rate: 60Hz.
2. Audio
  - a. Variable line level audio output or variable speaker level audio output.
3. Tuner
  - a. Decodes ATSC/NTSC/QAM signals (off-air/analog/digital).
4. Inputs & Outputs
  - a. Inputs
    - (1. HDMI: One minimum.
    - (2. PC input (D-sub) PC input (D-sub): One.
    - (3. PC input audio (Mini-Jack): One.
    - (4. Composite video: One
    - (5. RF Input: F-Connector.
  - b. Outputs
    - (1. Audio Output (Mini-Jack) One.
5. Control
  - a. Accepts RS-232 control. Control via serial port so that the installation of a remote infrared emitter to the front of the display is not required.

C. Acceptable Manufacturers:

1. NEC V552-AVT
2. Samsung
3. Panasonic
4. Sharp

**2.8 VIDEO DISPLAY LOUDSPEAKERS (MEETING ROOM)**

- A. The plasma display screen loudspeakers shall be sized by the manufacturer to match the height of the video display and shall be attached to either side of the video display. Loudspeakers to utilize video display internal amplifier.
- B. Specifications of equipment shall include:
  - 1. Audio
    - a. Driver Complement: Two 3.5" LF drivers, one .75" textile dome HF.
    - b. Nominal Coverage Angle: 120 degrees x 100 degrees (H x V).
    - c. Frequency Response: 130 Hz- 15 kHz, +/-3 dB.
    - d. Power Handling: 90 watts program.
    - e. Maximum Output: 102 dB continuous, 108 dB peak.
    - f. Weight: 15 pounds per pair
- C. Acceptable Manufacturers:
  - 1. INNOVOX FL-V2

**2.10 VIDEO DISPLAY WALL MOUNT-EXTENDING (MEETING ROOM)**

- A. The display mounts shall be installed where indicated in contract drawings. Audio visual contractor to provide mounting hardware and to coordinate with architect and general contractor on installation of mount and display in casework. Assembly and installation will be performed according to the instructions provided by the manufacturer.
- B. Video Display Mount-Extending specifications of equipment shall include:
  - 1. Type: Scissors-style mount that will extend straight out from the mounting surface up to 20". Mounts Flat-Panels up to 225 lbs. and in the size range from 37"- 63" diagonal.
  - 2. Tilt: Not required.
  - 3. Rotation and swivel: Includes swiveling capability +/- 45-degrees.
  - 4. Adjustments: Built-in lateral shift and post-installation leveling.
  - 5. Depth: 4.4" (folded), 19.7" (Extended).
- C. Acceptable Manufacturer
  - 1. Premier AM225F
  - 2. Chief
  - 3. Peerless

**2.11 LECTERN**

- A. The Lectern shall have a two-step sloped top with cutouts for interface on work surface. The interior shall have adjustable interior shelves, interior rack rails (~~18 units minimum~~) and levelers for venting. Doors shall be security doors and a service access door ~~with electronically controlled locks that are controllable through the control system~~. The lectern shall have 4"

heavy-duty lockable casters. Cabling between lectern and lectern interface wall box shall have a 3" floor grommet for power and audio visual cables. All audio visual cables shall be a strain relief, wrapped pigtail to wall box. Lighting shall be a **LittLite** as provided by manufacturer.

B. Single Bay Lectern specifications of equipment shall include:

1. Size approximately 40" w x 28" d x **44" h**
2. Laminate finish
3. **Non-Metal frame**
4. Flat work surface
5. Cut Out for cable connection box
6. Security doors with lock
7. Document camera pullout
8. Tower pc compartment
9. Adjustable shelf in pc compartment
10. Service access doors with lock
11. 14RU rack rails
12. Casters
13. Little Lite
14. Grommets as required
15. DC Ventilation fan

C. Acceptable Manufacturers:

1. In-View Furniture IVEL-BLJA
2. Middle Atlantic L5 Series Lectern
3. Malone Inc.
4. Miller's Millworks
5. MDI Creative

2.12 SIX INPUT SCALER WITH SWITCHER (SWITCHER/SCALER)

A. Six input Scaler with switcher shall be installed as indicated in contract documents for control routing of the video signals within the lectern system.

B. Six Input Scaler with Switcher shall meet the following requirements:

1. Video input, analog: Two (2) universal analog, consisting of any of the following formats- RGBHV, RGBS, RGsB, RGBcvS, component video, S-video, composite video.
2. Video input, digital: Four (4) HDMI digital video, HDCP compliant.
3. Connectors: Two female 15-pin HD for analog, four female HDMI type A for HDMI digital video.
4. Minimum/maximum analog levels- 0.0v to 1.0 Vp-p with no offset.
5. Horizontal frequency- 15 kHz to 100 kHz.
6. Vertical frequency- 24 Hz to 120 Hz.
7. Resolution range- 640x480 to 1920x1200 (reduced blanking), 480p, 576p, 720p, 1080i, 1080p, 2048x1080 sampled pixel for pixel.
8. Video output: 2 HDMI digital video (HDCP compliant)

9. Connectors: Two female HDMI for HDMI digital video.
10. Analog sampling: 12 bits per color; 13.5 MHz standard (video) 170 MHz standard (RGB)
11. Audio inputs: 6 stereo, balanced/unbalanced. 4 stereo, de-embedded from HDMI (2-channel, PCM only).
12. Connectors: (6) 3.5 mm captive screw connector, 5 pole, 4 female HDMI type A.
13. Nominal level: +4 dBu (1.23 Vrms), -10 dBV (316 mVrms).
14. Audio outputs, fixed: 1 analog (balanced/unbalanced), 2 HDMI embedded, all stereo/mono.
15. Audio outputs, variable: 1 analog (balanced/unbalanced).
16. Connectors: (2) 3.5 mm captive screw connectors, 5 pole; RCA (S/PDIF), HDMI.
17. Gain error: +/- 0.5 dB channel to channel.
18. Maximum output level: >+21 dBu, balanced; >+15 dBu, unbalanced.
19. Control/remote: Serial control port: One RS-232, captive screw connector. One USB connector, one Ethernet connector, one contact closure input connector (captive screw, five inputs).
20. Power supply: 100 VAC to 240 VAC, 50/60 Hz, internal; 26 watts maximum, regulated.
21. Rack Mount: 1U.
22. Enclosure type: Metal.

C. Acceptable Manufacturers Include:

1. Extron IN1606
2. Crestron

### 2.13 HDMI DE-EMBEDDER

- A. Contractor to provide HDMI De-Embedder where indicated to provide capture of the audio signal from the HDMI cabling signals.
- B. The HDMI De-Embedder shall meet the following specifications:
  1. Video
    - a. Maximum data rate 6.75 Gbps (2.25 Gbps per color).
    - b. Maximum pixel clock 225 MHz.
    - c. Resolution range Up to 1920x1200 or 1080p @ 60 Hz, 12-bit color.
    - d. Formats RGB and YCbCr digital video.
    - e. Standards DVI 1.0, HDMI 1.3, HDCP 1.2, EDID 1.3.
  2. Video input
    - a. Number/signal type: One single link HDMI
    - b. Connectors: One female HDMI type A
    - c. Equalization: Automatic for up to -12 dB of cable loss
    - d. Input cable length: Up to 25' (7.6 m)
  3. Video output
    - a. Number/signal type: One single link HDMI
    - b. Connectors One female HDMI type A.
    - c. Output cable length Up to 15 feet.
  4. Audio

- a. Signal/Noise: Greater than 92 dB, balanced, at maximum audio output,
5. Audio input
  - a. Number/signal type: One, combined with HDMI video input.
  - b. Source formats: PCM, Dolby Digital 2/0, Dolby Digital 2/0 Surround, Dolby Digital 5.1, Dolby Digital EX, DTS Digital Surround 5.1, DTS-ES and Matrix 6.1, DTS-ES Discrete 6.1.
  - c. Connectors: One female HDMI type A (shared with video input).
  - d. Sampling rates: 32, 44.1, 48 kHz.
  - e. Bit depths: 16, 20, 24 bit.
6. Audio output
  - a. Number/signal type
    - (1. One combined with HDMI video output and either one stereo balanced/unbalanced or one S/PDIF.
  - b. Connectors: (One) 3.5 mm captive screw connector, 5 pole and one female RCA jack (tip, ring).
  - c. Impedance: Stereo output: 50 ohms unbalanced, 100 ohms balanced
    - (1. S/PDIF output: 75 ohms.
  - d. Maximum level (Hi-Z): +10 dBV, unbalanced, full scale, at 1% THD+N.
7. Control/remote
  - a. USB control ports: One front panel female mini USB.
  - b. USB standards: USB 2.0, low speed.
8. General
  - a. External power supply: 100 VAC to 240 VAC, 50-60 Hz, external; to 12 VDC, 1 A, regulated.
  - b. Power input requirements: 12 VDC, 0.4 A from an external power supply
9. Mounting: Rack mount - Provide optional 1U rack shelf.
10. Enclosure type: Metal.
11. Enclosure dimensions: 1.7" H x 4.3" W x 3.0" D (1U high, quarter rack wide).

C. Acceptable Manufacturers Include:

1. Extron
2. Gefen, Inc.

## 2.14 HDMI DISTRIBUTION AMPLIFIER

A. HDMI Splitter specifications of equipment shall include:

1. Features:
  - a. Connects two HDMI / DVI displays from one HDMI source.
  - b. Attains resolutions up to 1080p, 2k, and 1920 x 1200.
  - c. HDMI and HDCP compliant, EDID management.
  - d. Locking HDMI connectors (utilize adapters for DVI)/
2. HDMI Features:
  - a. Lip-Sync.
  - b. 225 MHz pixel clock (up to 12 bit YUV 444 supported @ 1080p).

- c. Deep Color Supported (XV Color Supported).
  - d. Color Space Conversion Supported.
  - e. CEC Pass Through.
- 3. Video Amplifier Bandwidth: 225 MHz.
- 4. Input Video Signal: 1.2 Volts p-p.
- 5. Input DDC Signal: 5 Volts p-p (TTL).
- 6. Single Link Range: 1080p/1920 x 1200.
- 7. HDMI Connector: Type A 19 Pin Female.
- 8. Power Supply: 5V DC.
- 9. Power Consumption: 13 Watts (max).
- 10. Dimensions: 10.25" w x 1" h x 4.25" d

  

- B. Acceptable Manufacturers include
  - 1. Extron HDMI DA2
  - 2. Gefen Inc.

  

2.17 VGA TO HDMI SCALER (VGA TO HDMI)

- A. The VGA to HDMI Scaler shall be mounted as indicated in contract drawings. Audio Visual contractor to coordinate mounting requirements in rack. Audio visual contractor to provide mounting hardware as per manufacturer's recommendation.
- B. VGA to HDMI Scaler specifications of equipment shall include:
  - 1. Inputs: 1 UXGA on a 15-pin HD (F) connector; 1 component video on 3 RCA connectors; 1 analog unbalanced stereo audio on a 3.5mm mini jack connector (for the UXGA input); 1 analog unbalanced stereo audio (left and right) on RCA connectors, 4dBu nominal.
  - 2. Output: 1 HDMI.
  - 3. Output Resolutions: HDTV: 480i, 480p, 576i, 576p, 720p, 1080i, 1080p, VGA, SVGA, XGA, WXGA, SXGA, WSXGA, UXGA, WUXGA, NATIVE.
  - 4. Output Refresh Rate: 60Hz for computer graphics resolutions, 50/60Hz for HDTV resolutions.
  - 5. Controls: Front panel buttons for output resolution and menu driven OSD control.
  - 6. Additional Controls: Contrast, brightness, hue, saturation and sharpness; red, green and blue; resolution, image size.
  - 7. Power Source: 12V DC, 430mA.
  - 8. Dimensions: (8.46" x 6.34" x 1.7") W, D, H.
  - 9. Weight: 1.1 kg (2.43 lbs) approx.
- C. Acceptable Manufacturers Include:
  - 1. Extron
  - 2. Autopatch
  - 3. Gefen
  - 4. Aurora Multimedia

2.18 COMPOSITE VIDEO TO HDMI SCALER/CONVERTER (COMP/AUDIO TO HDMI/SCALER)

- A. Composite Audio to HDMI Adapter shall be installed as indicated in contract documents. Contractor to coordinate mounting requirements with equipment locations.
- B. Composite video to HDMI/SCALER specifications of equipment shall include:
  - 1. Digital Video Amplifier Bandwidth: 1.65 Gbps.
  - 2. Input Video Signal: 1.2 volts p-p.
  - 3. Single Link Range: 1080p/1920 x 1200
  - 4. Input/Output: HDMI Connector: Type A 19 pin female.
  - 5. Analog Video Connector 2: One RCA Composite.
  - 6. Analog Video Connector 3: One S-video
  - 7. Digital Audio Connector: Optical TOSlink.
  - 8. Analog Audio Connector: Two RCA.
  - 9. HDCP Compliant.
  - 10. OSD menu for picture adjustment.
  - 11. Power Supply: Five volts DC.
  - 12. Power Consumption: 20 watts (max)
- C. Acceptable Manufacturers Include:
  - 1. Extron
  - 2. Atlona

2.19 MINI-TWISTED PAIR HDMI TRANSMITTER/RECEIVER (UTP-T) and (UTP-R)

- A. Contractor to provide Mini-Twisted Pair Transmitter/Receiver where indicated or as required by distance for transmission of audio/video signals between input location and rack and between rack and display location. Provide wall-mounted or rack-mounted device as indicated. Type of UTP cable utilized shall be compatible with transmitter/receiver and with distance covered.
- B. The Mini-Twisted Pair Transmitter/Receiver shall meet the following specifications:  
Maximum data rate: 4.95 Gbps (1.65 Gbps per color).
  - 1. Maximum pixel clock: 165 MHz.
  - 2. Resolution range: Up to 1920x1200 or 1080p@ 60 Hz.
  - 3. Input Video Signal: RGB and YCbCr digital video.
  - 4. Standards: DVI 1.0, HDMI
  - 5. Input/Output: HDMI Connector: Type-A 19 pin female, single link HDMI (or DVI-D).
  - 6. Interconnection: Two UTP cables between transmitter, receiver.
  - 7. Control Signal Pass-through: single RS-232 input on transmitter, output on receiver.
  - 8. Power Supply: Twelve volts DC, external.
  - 9. Power Consumption: 12 watts (max).

## C. Acceptable Manufacturers Include:

1. Extron
2. Gefen
3. Magenta Research

## 2.20 TELECONFERENCING PROCESSOR (VIDEO TELECONF PROCESSOR)

- A. Teleconferencing processor shall be solid-state type for use in a commercial sound/video application. Audio Visual contractor shall provide ~~sound structure studio~~ and HDX ceiling microphones. All equipment shall be of the same manufacturer.
- B. Teleconferencing Processor shall meet the following specifications:
  1. Video Standards and Protocols
    - a. H.264, H.264 High Profile IP, H.263++, H.261
    - b. H.239 / Polycom People+Content
    - c. H.263 & H.264 Video Error Concealment
  2. Video Input
    - a. 2 x Polycom EagleEye™ HD camera
    - b. 1 x S-Video • 1 x DVI-I
  3. Video Out
    - a. 2 x DVI-I HD video out
    - b. VCR 1 x S-Video
  4. People Video Resolution
    - a. 720p, 30 fps from 512 Kbps
    - b. 720p, 60 fps from 832 Kbps
    - c. 1080p, 30 fps from 1024 Kbps
    - d. 4SIF/4CIF, 30 fps from 128 Kbps
    - e. 4SIF/4CIF, 60 fps from 512 Kbps
    - f. SIF (352 x 240), CIF (352 x 288)
    - g. QSIF (176 x 120), QCIF (176 x 144)
  5. Content Video Resolution
    - a. Resolutions supported: HD (1920 x 1080)WSXGA+ (1680 x 1050), SXGA (1280 x 1024), HD (1280 x 720), XGA (1024 x 768), SVGA (800 x 600), VGA (640 x 480)
    - b. Output: 720p (1280 x 720), 1080 (1920 x 1080), XGA (1024 x 768), SVGA (800 x 600)
    - c. Content Frame Rate: 5 - 30 fps
  6. Camera
    - a. Polycom EagleEye III camera 1280 x 720P or 1920 x 1080 EPTZ cameras 12X optical zoom, 72°FOV.
  7. Audio Input
    - a. 3 HDX microphone arrays supported
    - b. 1 x Line-level stereo in (Phoenix)
    - c. 1 x PC audio in (Phoenix)
    - d. 1 x VCR / DVD stereo audio-in (Phoenix)
  8. Audio Standards and Protocols

- a. Polycom StereoSurround
- b. 22 kHz bandwidth with Polycom Siren
- c. 22• 14 kHz bandwidth with Polycom Siren 14, G.722.1 Annex C
- d. 7 kHz bandwidth with G.722, G.722.1
- e. 3.4 kHz bandwidth with G.711, G.728, G.729A
- f. Automatic gain control
- g. Automatic noise suppression
- h. Keyboard noise reduction
- i. Live Music Mode
- j. Instant adaptation echo cancellation
- k. Audio error concealment
- 9. Other ITU-Supported Standards
  - a. H.221, H224/H.281, H.323 Annex Q, H.225, H.245, H.241, H.331, H.239, H.231, H.243, H.460, BONDING, Mode 1
- 10. Network
  - a. Polycom iPriority for QoS
  - b. 10/100 auto NIC (RJ45)
  - c. Auto-MDIX
  - d. H.323 and/or SIP up to 6 Mbps
  - e. Polycom Lost Packet Recovery (LPR™)
  - f. Reconfigurable MTU size (IP only)
  - g. 2 x RS232 (camera control on both)Second
- 11. RS232 port includes:
  - a. Data pass-through Audio mixer control Full serial API support
  - b. H.320 (optional)ISDN Quad BRI, PRI T1 or E1Serial (RS449, V.35 RS530 withRS366 dialing) Auto SPID detection and line number configuration
  - c. 1 x Analog phone interface (POTS)• Microsoft® Office Communications Server integration• Microsoft® ICE support
- 12. User Interface
  - a. Directory services
  - b. System management Web-based SNMP Polycom Converged Management
  - c. Application™ (CMA™)
  - d. International languages (17)
  - e. Wildcard language tool
  - f. USB software update
- 13. Security
  - a. Secure Web
  - b. Security mode
  - c. AES FIPS 197, H.235V3 and H.233/234
  - d. FIPS 140-2 Validation Certificate (#918)
  - e. IPv6 (DISA)
  - f. Secure password authentication

C. Acceptable Manufacturers:

- 1. Polycom HDX 8000 System
- 2. Tandberg (Cisco)
- 3. Sony

## 4. LifeSize

## 2.21 TELECONFERENCING CAMERA

- A. The Teleconferencing camera shall be of the same manufacture as the teleconferencing system and a product that meets the needs of a commercial application
- B. The Teleconferencing camera and shall meet the following specifications:
  - 1. Camera Type:
    - a. 1/3" CMOS
  - 2. Output:
    - a. SMPTE 274M 1920 x 1080, 60/50
  - 3. Focal Length:
    - a. F-3.7mm-44mm
    - b. Lens F number: 1.6
  - 4. Zoom
    - a. 12x Optical
  - 5. Focus:
    - (1. Auto
  - 6. Horizontal Field of View
    - a. 6.1° To 72°
  - 7. Vertical Field of View
    - a. 3.4° To 41°
  - 8. Min. Illumination
    - a. 50 lux (F1.6) / 50 ire
  - 9. Exposure
    - a. Auto-Iris, AGC
  - 10. SNR
    - a. 50dB
  - 11. Pan Range
    - a. 100° / -100°
  - 12. Tilt Range
    - a. + 20, -30°
  - 13. I/O
    - a. HDCI, 60 pin.
  - 14. Aux Power Connector
    - a. 12v @ less than 2A power

## C. Acceptable Manufacturers:

- 1. Polycom EagleEye III
- 2. Tandberg (Cisco)
- 3. Sony
- 4. LifeSize

## 2.22 CAMERA EXTENDER

- A. The Camera Extender shall consist of a separate transmitter and receiver that support operation of a Polycom camera at an extended distance from the system codec unit.
- B. The Camera Extender shall meet the following specifications:
  - 1. Extension Distance:
    - a. Allows extension distance of up to 500'.
    - b. Cable Adapt button allows for system optimization of gain, EQ, and skew compensation.
    - c. System passes camera control signals
  - 2. Cabling:
    - a. Camera interface module and head end interface module (receiver) connected by two CAT5e or CAT6 cables. One cable provides video signal and other cable provides system power. Camera interface module shall be powered remotely over connecting cable.
    - b. Adapter cables provided to connect head end video and control connectors to Polycom codec HDCI connector.
- C. Acceptable Manufacturers:
  - 1. Sound Control Technologies RemoteCam2
  - 2. Vaddio

## 2.23 TELECONFERENCING TOUCH PANEL

- A. The Teleconferencing Touch Panel shall be of the same manufacture as the teleconferencing system and shall be a product that meets the needs of a commercial application. Panel solution will allow the end-user to control all conference call features during a conference session.
- B. The Teleconferencing Touch Panel shall meet the following specifications:
  - 1. Technology:
    - a. Capacitive touch screen
    - b. Direct API command through network
  - 2. Power:
    - a. Power Over Ethernet (PoE).
- C. Acceptable Manufacturers: Polycom Touch Control

## 2.24 TELECONFERENCING MICROPHONE

- A. The Teleconferencing microphone shall be of the same manufacturer as the teleconferencing

system and a product that meets the needs of a commercial application. Contractor provide extension cables as required.

B. The Teleconferencing microphone and shall meet the following specifications:

1. Microphone Type:
  - a. Microphone array element
  - b. Electronics enclosure with ceiling mounting hardware (UL 2043 compliant and suitable for use in air-handling spaces)
  - c. One 30-foot (914 cm) plenum C-Link II cable
  - d. Microphone array element and interface cable available in black or white
2. Digital Microphone Specifications
  - a. 360-degree directional pickup
  - b. Three Cardioid elements per microphone
  - c. Elements spaced 120 degrees apart
  - d. Each Ceiling Microphone Array covers a 30' diameter or 15' radius area
  - e. Total coverage area for a single Ceiling Microphone Array is 700 square feet
3. Audio Features
  - a. Dynamic microphone steering
  - b. Full-duplex digital audio
  - c. Instant Adaptation Echo Cancellation
  - d. Automatic Noise Suppression (ANS)
  - e. Automatic Gain Control (ACG)

C. Acceptable Manufacturers:

1. Polycom Ceiling Microphone
2. Tandberg (Cisco)
3. Sony
4. LifeSize

**2.25 VIDEO CONFERENCING CART**

A. Mobile cart shall be provided for use in videoconferencing. Mobile cart to contain videoconferencing codec and flat panel monitor for use as a secondary (data) display. Cart shall be designed for size and weight of equipment provided. Include provision for power distribution. Video Conferencing Cart shall meet the following specifications:

1. Cart accommodates 42-61 inch displays.
2. Screen Height Adjustment: 45 inches to 59 inches (1143 - 1499mm) in 2 inch (51mm) increments.
3. Weight Capacity: 200 lbs (90.7kg).
4. Cart to be provided with a 47 inch flat panel LCD commercial monitor suitable for interface to video conferencing system codec. Tuner and loudspeaker/audio output capability not required for this display.

B. Acceptable manufacturers include:

1. Chief

## 2. Premier

## 2.26 ANNOTATION SCREEN CONTROLLER

A. The annotation screen controller shall be mounted on the lectern as provided in the contract documents and interfaced with the computer in the lectern for display on through the video projection system. Contractor shall provide, ~~or~~ the annotation controller software and the electronic practice management software packages. Contractor shall install and coordinate programming functionality to provide a complete integrated software solution. Include auto-launch cable that allows use with external laptop computer without requiring software installation on the laptop.

## B. Display Features:

1. Screen a-Si TFT active-matrix LCD display.
2. Resolution Native 720p (1366x768), aspect ratio- 16:9. Supports 4:3 and 16:10 aspect ratios with scaling.
3. Synchronization Range Horizontal: 30 KHz - 56.5 KHz.
4. Vertical: 50 Hz - 70 Hz.
5. Cover Plate Glass without film.
6. Viewing Angle Horizontal  $420^{\circ}$   $170^{\circ}$  and vertical  $400^{\circ}$   $160^{\circ}$  (typical).
7. Color Depth 24-bit color (16,777,216).
8. Contrast Ratio 580:1 (typical).
9. Brightness Luminance of 180 cd/m<sup>2</sup> (typical).
10. Input Video Signal Analog 0.7 Vp-p positive at 75 ohm.
11. Auto Adjustment Less than 2 seconds.
12. Display Response Time 5 msec (black-white)
13. On-Screen Display Control Brightness, contrast, pitch, phase, vertical position, horizontal position, language, back light, menu position, reset and color.

## C. Tablet Features:

1. Stylus Buttons 5 buttons for controlling stylus behavior: Left-Click, Eraser, and Black Ink, Blue Ink and Red Ink.
2. Function Buttons 5 function buttons: Right-Click, Floating Tools, Notebook Software, Screen Capture and Keyboard.
3. Technology USB interface
4. Stylus Tethered stylus with built-in holder.
5. Stylus Report Rate 100 points per second.

## D. Computer Requirements:

1. Supports Windows and Mac OS. HDMI video output from computer is recommended.

## E. Acceptable Manufacturers:

1. SMART Technologies SP518-SMP.

**2.27 CD/ DVD/BLU-RAY PLAYER (CD/DVD/BLU-RAY)**

- A. The CD/HD-DVD/BLU-RAY player shall be mounted as provided in the contract documents and mounted in the lectern for display on through the video projection system. Contractor shall install and coordinate programming functionality to provide complete integrated software with control system solution.
- B. CD/DVD/BLU-RAY shall meet the following specifications:
  - 1. Playback Capability
    - a. BD (Blu-ray Disc) Reading
    - b. Speed: 4.917m/sec
    - c. DVD (Digital Versatile Disc)
    - d. Reading Speed: 3.49 ~ 4.06 m/sec.
    - e. Play Time (Single Sided, Single Layer Disc): 135 min.
    - f. CD: 5 inches (COMPACT DISC):
      - g. Reading Speed: 4.8 ~ 5.6 m/sec.
      - h. Maximum Play Time: 74 min.
    - i. CD: 3 1/2 inches (COMPACT DISC)
    - j. Reading Speed: 4.8 ~ 5.6 m/sec.
    - k. Maximum Play Time: 20 min.
      - (1. Reading Speed: 4.8 ~ 5.6 m/sec.
    - l. Maximum Play Time: 74 min.
  - 2. Video Output
    - (1. Composite Video
    - b. Blu-ray/DVD Disc: 480i
    - c. Component Video: Blu-ray Disc: ~~1080i, 720p, 480p~~, 480i
      - (1. Video/Audio
    - d. HDMI=1080p, 1080i, 720p, 480p PCM multichannel audio, Bit stream audio
  - 3. Audio Output
    - a. Two channel left & right
    - b. Digital Audio output: Optical
    - c. S/N Ratio: 110 dB
    - d. Dynamic Range: 100 dB
    - e. Total Harmonic: Distortion 0.003%

**C. Acceptable Manufacturers include:**

- 1. Samsung
- 2. LG
- 3. Sony
- 4. D&M Professional

**2.28 CABLE TELEVISION TUNER (CATV TUNER)**

- A. The Cable Television Tuner shall be mounted as provided in the contract documents and mounted in the Rack for display on through the video projection system. Contractor shall install

and coordinate programming functionality to provide complete integrated software with control system solution.

B. Cable Television Tuner shall meet the following specifications:

1. Type: Universal NTSC, digital ATSC and clear QAM Tuner
2. Tuning
  - a. Switchable Cable and Off-Air RF inputs.
  - b. Type: ATSC, NTSC and Clear QAM.
  - c. DTV Standards: (1080i/720p/480p/480i).
  - d. Aspect Ratio: Adjustable, variety of modes for widescreen 16:9 and normal 4:3 broadcasts.
  - e. Captioning: Analog and Digital set by program or customized for size, font, and attributes.
  - f. Favorites: Favorite channel menu.
  - g. Lock: Parental option for channels and/or rating Digital/Analog Conversion 96KHz/24bit.
3. Front Panel
  - a. RS-232 TX/RX LEDs (Yellow).
  - b. Power button.
  - c. Volume Up and Down.
  - d. Channel Up and Down.
  - e. Channel Display (Red LED, dot for major/minor separator, dot for Air/Cable tuning).
  - f. IR Sensor.
  - g. DC Power LED (Green)
  - h. RS-232 LEDs: RX (Yellow), TX (Red).
4. Back Panel
  - a. RF Input: Dual RF Cable and Off-Air inputs, Type female F connector at 75 ohm impedance.
5. HD Outputs:
  - a. HDMI and switchable RGB/Component outputs operate simultaneously.
  - b. Component: RCA Pr, Pb, Y outputs (1080i/720p/480p/480i).
  - c. RGB: RGBHV DB-15 female (1080i/720p/480p).
  - d. HDMI: HDMI receptacle (1080i/720p/480p), version 1.2, PCM digital audio, HDCP.
  - e. Digital Audio S/PDIF: Coax and TOSlink optical output, Dolby 5.1, PCM, or PCM variable.
6. AV Outputs:
  - a. Simultaneous with HD output.
  - b. Composite Video: RCA female jack.
  - c. Audio L and R: 2 stereo RCA female jacks, variable level.
7. RS-232 Control:
  - a. Connector: DB-9 male, RS-232 data link to control system.
  - b. Baud Rate: 300 to 19,200 baud (9600 default), 8 data bits, no parity, 1 stop.
8. IR Control: 3.5 mm stereo input for external IR sensor or wired IR.
9. Power: Connector 2.1mm coaxial jack (inside center conductor positive) rated at 1.3 A

maximum, 11.5 to 15 VDC, 12 VDC typical.

C. Acceptable Manufacturers include:

1. Contemporary Research
2. Extron (**Digital cable systems only**)
3. **Aurora Multimedia**

2.29 COMPUTER SYSTEM

A. The Computer system shall be ~~rack~~ mounted as provided in the contract documents and interfaced with annotation system, owner provided network and the control system display through the video projection systems. **Computer technology to be comparable with typical new business office unit.**

B. The computer Systems equipment shall be comprised of but not limited to the following minimum components/equipment:

1. System Type: Tower, provide with
2. Operating System: Microsoft Windows Version 7.
3. Operating System Backup Media Microsoft Windows Version 7 Media
4. Processor: Intel Core Duo Processor E3800 (2.83GHz, 6MHz, 1333MHz FSB) **minimum.**
5. Memory: **4GB DDR2 SDRAM 1333MHz.**
6. Hard Drive: 300GB 7200rpm Serial **SATA** hard drive w/ 8MB cache
7. Optical Drive: 20x min. 48x max. CD-ROM drive
8. Backup Media: E-Series 4610D Drivers & Applications CD Backup Media
9. Warranty: Three year part/labor/NBD on-site/3 year technical support
10. Management Software: Intel LANDesk Client Manager V.8.1 DWL
11. Controller Card: Integrated Ultra ATA100 and Serial ATA II/300 controllers
12. Expansion Slots: One PCI-E x 16, One PCI-E x 1, and 2 Full Height, Full Length PCI Slots
13. External Ports: Six USB 2.0 (2 Front and 6 Rear), (2) PS/2, (1) RJ-45 Integrated LAN, (1) Microphone, (1) Headphone, (3) Rear Audio, (1) VGA, (1) DVI, **(1) HDMI**
14. Certification: Energy Star Compliant
15. Video: 256MB, ATI Radom 2400XT, Dual Monitor DVI or VGA (TV Out).
16. Sound: Integrated Sound Blaster compatible audio.
17. Network: Integrated Intel® 10/100/1000 Twisted Pair Ethernet
18. Additional System Software: Adobe® Acrobat Reader® **10.1** and Google Toolbar
19. Computer for lectern to be provided with **19-inch DVI/HDMI-monitor (not required if Annotation Screen is provided)**, Soft-touch USB Optical Wheel Mouse wireless mouse, wireless keyboard.

C. Acceptable Manufacturers:

1. Gateway

2. Dell
3. Hewlett Packard

## 2.30 NETWORK ROUTER/SWITCH

- A. The Network Router shall be rack mounted as provided in the contract documents and interfaced to the owner provided network.
- B. The Network Router shall meet the following specifications:
  1. Network switch minimum configuration shall be 12 x RJ45 10/100/1000 ports (IEEE 802.3 10Base-T, IEEE 802.3u 100Base-T, IEEE 802.3ab 1000Base-T gigabit Ethernet).
- C. Acceptable manufacturers shall be HP, Cisco, Dell or Belkin.

## 2.31 CONTROL SYSTEM

- A. The Touch-screen panels shall serve a single graphic user interface for the user of the audio Visual systems. Audio Visual contractor shall provide a complete and operational system for control of the video presentation and audio systems as indicated in the contract documents coordinate programming and systems operational functionality requirements for interface and monitoring as owners requirements. All control systems shall be from a single manufacture and shall interface to owners existing systems. Programming of panels and system shall be by a factory trained representative of the Audio Visual contractor.
- B. The control system shall meet the following specifications:
  1. Ethernet control interface
    - a. Connectors 1 RJ-45 female connector
    - b. Data rate 10/100Base-T, half/full duplex with autodetect
    - c. Protocols ARP, ICMP (ping), IP, TCP, UDP, DHCP, HTTP, SMTP, Telnet
    - d. Default settings Link speed and duplex level = autodetected
    - e. IP address = 192.168.254.254
    - f. Subnet mask = 255.255.0.0
    - g. Gateway = 0.0.0.0
    - h. DHCP = off
    - i. Web server Up to 200 simultaneous sessions
    - j. 975 MB nonvolatile user memory
  2. Program control Global Configurator for Windows
    - a. Simple Instruction Set (SIS)
    - b. Microsoft® Internet Explorer, Telnet
    - c. Viewer requirements Microsoft® Internet Explorer® ver. 6 or higher
  3. Serial control interface
    - a. Quantity/type 2 bidirectional RS-232, RS-422, RS-485 6 bidirectional RS-232
    - b. Connectors (2) 3.5 mm captive screw connectors, 5 pole
    - c. (6) 3.5 mm captive screw connectors, 3 pole

- d. Baud rate and protocol 300 to 115200 baud (9600 baud = default); 8 (default) or 7 data bits; 1 (default) or 2 stop bits; no parity (default), or even or odd parity
- e. Pin configurations
  - (1. Serial, 5-pole captive screw Pin 1 = Tx, 2 = Rx, 3 = GND, 4 = RTS, 5 = CTS
  - f. Serial, 3-pole captive screw Pin 1 = Tx, 2 = Rx, 3 = GND
- 4. Flex I/O control interface
  - a. Quantity/type 4 analog input or digital input/output (configurable)
  - b. Connectors (1) 3.5 mm captive screw connector, 5 pole
- 5. Digital inputs
  - a. Input voltage range 0 to 24 VDC, clamped at +30 VDC
  - b. Input impedance 28k ohms
  - c. Programmable pullup 2k ohms to +5 VDC
  - d. Threshold low to high Programmable range: 100 mV to 24 VDC, default = 2 VDC
  - e. Threshold high to low Programmable range: 100 mV to 24 VDC, default = 1 VDC
- 6. Digital outputs 250 mA sink from 24 VDC max.
  - a. Analog inputs 12 bit A/D, 0 to 24 VDC
  - b. Pin configurations 1, 2, 3, 4 = digital I/Os 1, 2, 3, 4; 5 = GND
- 7. Control — IR/serial ports
  - a. Quantity/type 8 programmable: unidirectional RS-232 ( $\pm 5$  V), or TTL level (0 to 5 V) infrared (carrier and non-carrier) up to 1 MHz
  - b. Connectors (4) 3.5 mm captive screw connectors, 4-pole
  - c. Baud rate and protocol (RS-232) 300 to 115200 baud (9600 baud = default); 8 (default) or 7 data bits; 1 (default) or 2 stop bits; no parity (default), or even or odd parity
  - d. Pin configurations For each port, pin 1 = signal, 2 = GND
    - (1. IR output carrier frequency 30 kHz to 1 MHz
    - (2. IR learning carrier frequency 30 kHz to 1 MHz
    - (3. IR learning capture distance 2" (5.1 cm) to 12" (30.5 cm) from the front panel
- 8. Relay control interface
  - a. Quantity/type 8 normally open relays
  - b. Relay control connectors (4) 3.5 mm captive screw connectors, 4 pole
  - c. Relay control contact rating 24 V, 1 A
- 9. Switched DC power output
  - a. Quantity/type 4 switched 12 VDC outputs
  - b. Connectors (4) 3.5 mm captive screw connectors, 2 pole
  - c. Power Maximum 40 watts total
  - d. Power sense range 0.1 watt to 40 watts
- 10. General
  - a. Power supply Internal
  - b. Input: 100-240 VAC, 50-60 Hz
  - c. Power consumption 63.3 watts
- 11. Cooling Convection, no vents
- 12. Thermal dissipation 33.2 BTU/hr
- 13. Mounting: Rack mount with optional 1U rack shelf
- 14. Enclosure type Metal

15. Enclosure dimensions 1.7" H x 8.7" W x 10.5" D (1U high, half rack wide)

C. Acceptable Manufacturers:

1. Extron
2. Crestron
3. AMX

**2.32 CONTROL SYSTEM (CASE STUDY LECTERN)**

A. The Touch-screen panels shall serve a single graphic user interface for the user of the audio Visual systems. Audio Visual contractor shall provide a complete and operational system for control of the video presentation and audio systems as indicated in the contract documents coordinate programming and systems operational functionality requirements for interface and monitoring as owners requirements. All control systems shall be from a single manufacture and shall interface to owners existing systems. Programming of panels and system shall be by a factory trained representative of the Audio Visual contractor.

B. The control system shall meet the following specifications:

1. Ethernet control interface
  - a. Connectors 1 RJ-45 female connector
  - b. Data rate 10/100Base-T, half/full duplex with autodetect
  - c. Web server Up to 200 simultaneous sessions
  - d. 975 MB nonvolatile user memory
2. Serial control interface
  - a. Quantity/type 3 bidirectional RS-232
  - b. Connectors (1) 3.5 mm captive screw connectors, 5 pole (includes RTS, CTS)
  - c. (2) 3.5 mm captive screw connectors, 3 pole
3. Digital inputs
  - a. Quantity 4, input voltage range 0 to 5 VDC, clamped at 5.1 VDC
  - b. Threshold 1.6 VDC
4. Relay outputs
  - a. Quantity 4, normally open
  - b. Rated at 24 VDC, 1 Amp maximum
  - c. (1) 3.5 mm captive screw connector, 5 pole
5. IR/serial ports
  - a. Quantity/type 4 Infrared (carrier and non-carrier) up to 1 MHz
  - b. Connectors (2) 3.5 mm captive screw connectors, 4-pole
6. General
  - a. Power supply- External, 12 VDC, 1 Amp maximum
7. Mounting: Rack mount with optional 1U rack shelf
8. Enclosure type Metal
9. Enclosure dimensions 1.7" H x 4.3" W x 3.0" D (1U high, quarter rack wide)

C. Acceptable Manufacturers:

1. Extron IPL250 or comparable by Crestron or AMX.

2.33 FLIP-UP PROGRAMMABLE TOUCH SCREEN CONTROL PANEL (CUBBY)

- A. Touch-Screen controller shall be a stand-alone media control panel that is mounted in table mountable enclosure with interface connector plate capacity. System shall be compatible with Touch-Screen panel and meet the following specifications: Contractor shall provide for mounting in Lectern.
- B. Touch-Screen Controller shall be mounted in cubby box and meet the following specifications:
  1. Display
    - a. Screen type: Active matrix TFT color display.
    - b. Size: 3.5" (8.9 cm), measured diagonally.
    - c. Resolution: 320x240.
    - d. Aspect ratio: Standard.
    - e. Color depth: 18 bit, 256k colors.
    - f. Transparency: 8 bit alpha channel.
    - g. Brightness: 225 nits (cd/m<sup>2</sup>).
    - h. Contrast: 80:1.
    - i. Backlight: LED.
    - j. Viewing angle:  $\pm 50^\circ$  horizontal,  $+50^\circ$  vertical.
    - k. Touch screen: Resistive membrane.
  2. Memory
    - a. SDRAM: 8 MB for graphics processing 8 MB for system use.
    - b. Flash: 15 MB for project storage1 MB for system use.
  3. Control
    - a. Interface: Ethernet interface control/communications port one female RJ-45 connector.
    - b. Ethernet data rate: 10/100Base-T, half/full duplex with auto-detect.
    - c. Ethernet protocol: ICMP, IP, TCP (control), UDP, DHCP, Telnet.
    - d. Default settings: Link speed and duplex level: auto-detected IP address = 192.168.254.254 Subnet mask = 255.255.0.0Default gateway = 0.0.0.0DHCP = off.
    - e. Program control: Microsoft® Internet Explorer ver.6 or higher.
    - f. Control— touch panel
    - g. Lid switch: On/off.
    - h. Light sensor: On/off.
    - i. External buttons: 10 backlit, customizable.
  4. Video input:
    - a. Number/signal type: One S-video or composite video.
    - b. Connectors: Two female BNC.
    - c. Nominal levels: One V<sub>p-p</sub> for Y of S-video and for composite video0.3 V<sub>p-p</sub> for C of S-video.
    - d. Impedance: 75 ohms.
    - e. Standards: NTSC.
  5. Audio output

- a. Speaker output: One mono, 89 dB SPL, 0.1 watt, 0.1 m, half space.
- b. Frequency response: 900 Hz to 6 kHz,  $\pm 5$  dB.
- c. Playback format(s): WAV files: 8 bit PCM, mono, 8 kHz sampling.

6. General

- a. Power input requirements: +12 VDC, 0.75 A.
- b. Mounting: Furniture mount: With included hardware.
- c. Min./max. Table thickness: 0.375" to 2.00".
- d. Enclosure type: Metal

C. Acceptable Manufacturers:

- 1. Extron
- 2. Crestron
- 3. AMX

2.34 AUDIO DSP MATRIX MIXER WITH ACOUSTIC ECHO CANCELLATION (10X6)

A. Audio Mixer shall be rack mounted. All internal processing shall be digital (DSP). Software shall be provided for creating/connecting DSP system components within each hardware unit. Available system components shall include (but not be limited to) various forms of: mixers (including automatic), equalizers, filters, crossovers, dynamics/gain controls, routers, delays, remote controls, meters, generators, and diagnostics. Channels shall gate silently for system response and clarity. Ethernet communications shall be utilized for software control and configuration.

B. Audio DSP matrix mixer shall meet the following specifications:

- 1. Inputs: minimum 8, electronically balanced, on plug-in barrier-strip connectors.
- 2. Expandable Digital audio input and output capability Via AVB or Dante™ digital audio networking protocols.
- 3. Digital Audio Connectivity shall support most current Dante™ Protocols.
- 4. Maximum input level: +24dBu
- 5. Equivalent Input Noise (EIN): Less than -125dBu with 150 Ohms source.
- 6. Outputs: Eight, electronically balanced, on plug-in barrier-strip connectors.
- 7. Maximum output level: +24dBu
- 8. Digital Resolution/ Sample Rate: 24 bit, 48 kHz
- 9. Frequency Response: 20 Hz to 20 KHz (+0/-4 dB)
- 10. Total Harmonic Distortion: Less than 0.04% (20Hz to 20 KHz, +4dBu output, mic level input)
- 11. Dynamic Range: 107dB typical (20 Hz to 20 KHz).
- 12. Connections shall allow sharing of digital audio within multi-unit systems.
- 13. Software shall operate on a computer running Windows 8 or OSx
- 14. After initial programming, systems may be controlled using TCP/IP, USB, or RS-232 serial communication by third party control systems, by PC computer, and/or by dedicated control devices.
- 15. UL listed and shall follow AES48-2005 Grounding and EMC practices.

## C. Acceptable manufacturers:

1. Biamp NEXIA VC
2. BSS
3. Symetrix

2.35      **AUDIO            DSP            MATRIX            MIXER            (AUDIO            PROCESSOR)**

A. Audio Mixer shall be rack mounted. All internal processing shall be digital (DSP). Software shall be provided for creating/connecting DSP system components within each hardware unit. Available system components shall include (but not be limited to) various forms of: mixers (including automatic), equalizers, filters, crossovers, dynamics/gain controls, routers, delays, remote controls, meters, generators, and diagnostics. Channels shall gate silently for system response and clarity. Ethernet communications shall be utilized for software control and configuration. After initial programming, systems may be controlled using either TCP/IP or RS-232 serial communication by third party control systems (such as AMX), by PC computer, and/or by dedicated control devices. Software shall operate on a PC computer running Windows XP Professional/Vista. Audio DSP matrix mixer shall meet the following specifications:

1. Inputs: Four, mono, electronically balanced/ unbalanced, on two captive screw connectors, 6-pole. Nominal level adjustable from -20 dBu to 0 dBu.
2. Input Gain: Gain shall be electronically adjustable from -18dB up to +24dB, input impedance >10k ohms.
3. Maximum input level: +21dBu (balanced).
4. Outputs: Four, mono, electronically balanced, on two captive screw connectors, 6-pole.
5. Maximum output level: +21 dBu.
6. Digital Resolution/ Sample Rate: 24 bit, 48 kHz
7. Frequency Response: 20 Hz to 20 KHz (+0/-3 dB)
8. Total Harmonic Distortion: Less than 0.02% (1 kHz, maximum output level).
9. Signal to Noise: >100 dB, (20 Hz to 20 KHz, maximum output).
10. Control: Bi-directional RS-232 on captive screw connector.

B. Acceptable manufacturers include:

1. Extron DMP44
2. Biamp
3. Crestron

2.36      **MULTI-CHANNEL AUDIO AMPLIFIER (TWO CHANNEL)**

A. Amplifiers shall be rack mounted. Amplifiers shall be solid-state type for use in a commercial sound re-enforcement application with capacity for digital signal processing module. Amplifiers shall contain circuit breaker for overload protection, high temperature automatic reset protection, and electronic output protection. Amplifier controls shall have on/off switch and pilot light, master gain control, signal input/output and input channel controls. Amplifiers

shall conform to the following minimum requirements: Independent power limiters on each channel with adjustable threshold, attack and release times. Amplifiers shall not be loaded over 70% of the power output rating. Amplifier should be provided with standby power control or with auto power-shutdown.

B. Amplifier shall meet the following specifications:

1. Audio
  - a. Voltage gain: 24 dB.
  - b. Stereo channel separation: Greater than 75 dB @ 1 kHz.
  - c. CMRR: 75 dB @ 1 kHz (typical).
2. Audio input
  - a. Number/signal type: One stereo or two mono, balanced/unbalanced.
  - b. Connectors: One 3.5 mm captive screw connector, 5 pole.
  - c. Impedance: Greater than 10k ohms unbalanced/balanced, DC coupled.
  - d. Nominal level: Plus dBu (1.23 Vrms), balanced.
  - e. Maximum level: Plus 20 dBu (7.75 Vrms), balanced.
  - f. Input sensitivity: Plus 4 dBu (1.23 Vrms).
3. Audio
  - a. Audio output: Number/signal type: One stereo, 4- or 8-ohm direct.
  - b. Connectors: One 5 mm screw lock captive screw connector, 4 pole.
  - c. Load impedance: 4 ohms minimum.
  - d. Amplifier type: Class D.
  - e. Output power: 400 75 minimum watts rms per channel, 4 ohms, 1 kHz, <0.05% THD.
  - f. Frequency response: 20 Hz to 20 kHz,  $\pm 1$  dB.
  - g. THD + Noise: 0.05% @ 20 Hz-20 kHz, 8 ohms, at 3 dB below clipping.
  - h. Damping factor: Greater than 100 @ 8 ohms.
4. Control/remote — amplifier
  - a. Standby power control: Contact closure, pin 4 = GND, pin 5 = standby.
5. General
  - a. Power: 100 VAC to 240 VAC, 50-60 Hz, internal.
  - b. Typical: 26 watts at 8 ohms
  - c. Standby: Less than 1 watt (triggered by contact closure or after 1 hour with no signal). 1/8 power (pink noise) 4 ohms (x2): 14 watts (48 BTU/hr) 8 ohms (x2): 14 watts (48 BTU/hr) 70 Protection: Clip limiting, thermal, short circuit, DC output.
  - d. Indication: Limiter/Protect LED indicates the onset of clip limiting, thermal cycling, short circuit, or DC output protection.
6. Mounting
  - a. Rack mount: One rack shelf.
  - b. Enclosure type: Metal.
  - c. Enclosure dimensions: 1.7" H x 8.7" W x 9.5" D (One Unit high, half rack wide

C. Acceptable manufacturers include:

1. Extron
2. QSC

3. Crown
4. Lab Gruppen

## 2.37 MULTI-CHANNEL AUDIO AMPLIFIER (THREE CHANNEL)

- A. Amplifiers shall be rack mounted. Amplifiers shall be solid-state type for use in a commercial sound re-enforcement application with capacity for digital signal processing module. Amplifiers shall contain circuit breaker for overload protection, high temperature automatic reset protection, and electronic output protection. Amplifier controls shall have on/off switch and pilot light, master gain control, signal input/output and input channel controls. Amplifiers shall conform to the following minimum requirements: Independent power limiters on each channel with adjustable threshold, attack and release times. Amplifiers shall not be loaded over 70% of the power output rating. **Amplifier should be provided with standby power control or with auto power-shutdown.**
- B. Amplifier shall meet the following specifications:
  1. Audio
    - a. Voltage gain: Channels 1 and 2, 23x (27 dB)  
(1. Channel 3, 57x (35 dB)
    - b. Crosstalk: Greater than 75 dB @ 1 kHz.
    - c. CMRR: 75 dB @ 1 kHz (typical).
  2. Audio input
    - a. Number/signal type: Three balanced/unbalanced.
    - b. Connectors: One 3.5 mm captive screw connector, 5 pole.
    - c. Impedance: Greater than 10k ohms unbalanced/balanced, DC coupled.
    - d. Nominal level: Plus 4 dBu (1.23 Vrms), balanced.
    - e. Maximum level: Plus 20 dBu (7.75 Vrms), balanced.
    - f. Input sensitivity: Plus 4 dBu (1.23 Vrms).
  3. Audio
    - a. Audio output: Number/signal type:
      - (1. Two channels 4- or 8-ohm direct.
      - (2. One channel, 70 volts.
    - b. Connectors: One 5 mm screw lock captive screw connector, 4 pole.
    - c. Load impedance:
      - (1. Channel 1 & 2, 4 ohms minimum.
      - (2. Channel 3, 25 ohms.
    - d. Amplifier type: Class D.
    - e. Output power:
      - (1. Channel 1 & 2, 200 watts rms per channel, 4 ohms, 1 kHz, 0.1% THD.
      - (2. Channel 3, 200 watts rms per channel, 70v, 1 Khz, 0.1% THD.
    - f. Frequency response: 20 Hz to 20 kHz,  $\pm 1$  dB.
    - g. THD + Noise:
      - (1. Channel 1 & 2, 0.1% @ 20 Hz-20 kHz, 8 ohms, at 3 dB below clipping.
      - (2. Channel 3, 0.1% @ 20 Hz-20 kHz, 8 ohms, at 3 dB below clipping.
    - h. Damping factor:
      - (1. Channel 1 & 2, Greater than 100 @ 8 ohms.

(2. Channel 3, Greater than 100 @ 25 ohms.

- 4. Control/remote — amplifier
  - a. Standby power control: Contact closure, pin 4 = GND, pin 5 = standby.
- 5. General
  - a. Power: 100 VAC to 240 VAC, 50-60 Hz, internal.
  - b. Typical: 4 ohms (x2) + 70 V: 120 watts, 8 ohms (x2) + 70 V: 90 watts
  - c. Standby: Less than 1 watt (triggered by contact closure or after 25 minutes with no signal).
  - d. Protection: Clip limiting, thermal, short circuit, DC output.
  - e. Indication: Limiter/Protect LED indicates the onset of clip limiting, thermal cycling, short circuit, or DC output protection.
- 6. Mounting
  - a. Rack mount: One rack shelf.
  - b. Enclosure type: Metal.
  - c. Enclosure dimensions: 1.7" H x 17.4" W x 12.0" D (One Unit high, one rack wide)

C. Acceptable manufacturers include:

- 1. Extron
- 2. QSC
- 3. Crown

## 2.38 GOOSENECK MICROPHONES

A. Gooseneck microphones shall be mounted in lectern; the microphones shall be for use in a commercial sound re-enforcement application.

B. Goose Neck microphone shall meet the following specifications:

- 1. Frequency Range: 30–18,000 Hz.
- 2. Polar Pattern: Hypercardioid.
- 3. Sensitivity at 1,000 Hz: 8.5 mV/ Pa.
- 4. Equivalent Noise Level: 21 dB-A.
- 5. Sound Pressure Level for 1% THD: 133 dB.
- 6. S/N Ratio (A-weighted): 73 dB.
- 7. Power Requirement: 9-52 volts.
- 8. Connector: 3-pin XLR type.
- 9. Finish: Dark gray matte.
- 10. Size: Diameter 0.35 in. length 5.4 in.
- 11. Included Accessories: Mount/adapter, Long gooseneck.

C. Acceptable manufacturers include:

- 1. AKG
- 2. Sennheiser
- 3. Shure

**2.39 HAND-HELD MICROPHONES (CASE STUDY ROOM WITH M-4)**

- A. Hand-Held Microphones shall be provided for use with the systems. The microphones shall be for use in a commercial sound re-enforcement application.
- B. Systems microphones include:
  - 1. Handheld dynamic Cardioid pattern microphone with 20-foot XLR microphone cable, Shure SM 58 designed for speech applications.
    - a. Quantity shall be
    - b. Two per system.
  - 2. Acceptable manufacturers include:
    - a. Shure
    - b. AKG
    - c. Sennheiser

**2.40 MICROPHONE STANDS (CASE STUDY ROOM WITH M-4)**

- A. Microphone stands shall be provided for use with systems microphones shall be for use in a commercial sound re-enforcement application.
- B. Systems microphone stands include:
  - 1. Floor Base Stand with weighted base.
    - a. 14.00 lbs.
    - b. Base Finish Ebony
    - c. Tube Finish Chrome
    - d. Base Size 12" Diameter.
    - e. Height Span 37
    - f. Quantity shall be Two per system.
  - 2. Acceptable manufacturers include:
    - a. Atlas
    - b. Lowell

**2.41 WIRELESS MICROPHONE SYSTEM**

- A. Wireless microphone receivers shall be rack mounted and shall be solid-state type for use in a commercial sound re-enforcement application. Cabling, antenna, ~~antenna combiner~~ shall be as per manufacturer's requirements to provide maximum coverage/reception for the auditorium. Microphone controls include frequency selector, on/off, and mute switches, input level control, audio overload and battery status indicators. A security cover shall prevent unintentional readjustment. Microphones shall use standard 1.5 V AA size dry or rechargeable batteries. **Contractor to provide frequency coordination with all radio frequency sources at building**

**location, including television stations and other wireless units, to avoid interference.**

B. Wireless microphone receivers shall meet the following specifications:

1. Carrier frequency range: **740 470** MHz to **865 698** MHz.
2. Modulation: Frequency Modulation (FM).
3. Audio bandwidth: 40 to 20,000 Hz.
4. Total Harmonic Distortion: 0.8% typical.
5. Signal/noise ratio: 103 dB (A) typical.
6. Power supply: 120/230 VAC, 50/60 Hz, 95 ±15 mA
7. Audio outputs: balanced XLR and unbalanced TS 1/4" jack, adjustable from microphone to line level.
8. Dimensions: 7.8" x 5.3" x 1.6".
9. Net weight: 16.6 oz.

C. Systems microphones include:

1. Handheld Dynamic Cardioid microphone,
  - a. Quantity shall be One per system.
2. Omnidirectional Lavalier or headset microphone with belt pack and microphone shall be designed for speech applications.
  - a. Quantity shall be One per system.

D. Acceptable manufacturers include:

1. **Shure SLX series or comparable from Sennheiser or TOA.**

#### 2.42 CEILING MOUNTED PROGRAM SPEAKERS

A. Program speakers shall be mounted as indicated in contract documents to provide optimum mid to near field coverage for presentation source material. Coordinate color with architect and locations with ceiling grid and structural.

B. Ceiling Mounted Program speaker specifications of equipment shall include:

1. Frequency Response 50-20,000 HZ +/- 3db
2. Sensitivity 91 db (1w/1m)
3. Power Capacity, watts 50 RMS; 100 Program
4. Crossover Frequency 3500 HZ @ 6db/octave
5. Nominal Impedance 8 ohms
6. Nominal Dispersion At least 110° up to 6000HZ
7. Low Frequency Transducer 6-1/2" 1-1/2" voice coil
8. High Frequency Transducer 1" titanium dome
9. Tuning 8" passive radiator

10. Enclosure Type Optimally vented
11. Enclosure Dimensions 23 5/8"H x 23 5/8"W x 8"D
12. Enclosure Construction 1/2" particle board w/internal stiffeners
13. Finish: Coordinate with Architectural
14. Weight 21 lbs.
15. Transformers: 70volt transformers.

C. Acceptable manufacturers include:

1. KSI
2. Electrovoice
3. EAW

**2.43 CEILING MOUNTED SPEAKERS**

A. Speakers shall be mounted in ceiling. Each speaker installation shall be complete, including, where applicable, matching transformers, mounting brackets/back boxes as per manufacturers recommended construction compatible with the total system. Speakers shall be mounted as indicated in contract documents to provide optimum mid to near field coverage for presentation/source material.

B. Ceiling speakers shall meet the following requirements:

1. Enclosure Type Sealed, two-way
2. Speaker Components:
  - a. **4"** cone woofer (Neodymium magnet)
  - b. **3/4"** balanced-dome tweeter
3. Impedance Direct: **6** Ohms.
4. Transformer:
  - a. 70.7 V line: **30W, 15W, 7.5W, 3.75W**
  - b. 100 V line: **30W, 15W, 7.5W**
5. Sensitivity (1 W / 1 m, 1/2 space): **87** dB SPL.
6. Power Handling
  - a. Continuous Program: **90 80** W
  - b. Continuous Pink Noise, 24 Hrs: **40** W.
7. Frequency Response: **85 to 19 Hz**
8. Crossover Frequency: **2.7k Hz**
9. Material / Finish
  - a. Trim Piece: Fire-resistant ABS resin (UL94: V-0 grade), white
  - b. Adapter Panel: Rolled steel plate
  - c. Grille: Rolled Steel plate, white, paintable.

C. Acceptable Manufacturers include:

1. **TANNOY CVS4**
2. Atlas Soundolier

3. TOA Electronics
4. Electrovoice

#### 2.44 POWER CONDITIONER

- A. Power conditioners shall be mounted in lectern and amplifier rack and shall be for use in a commercial sound re-enforcement application. Power on sequencing shall be provided for amplifiers in amplifier rack.
- B. Power conditioners shall meet the following specifications:
  1. Maximum load: 15 amps (1800 watts at 120 VAC).
  2. Input Voltage Range: 85 to 135 VAC.
  3. Mains Wiring analyzer: Detects 1 normal mode and 5 fault modes
  4. Delay Interval: 5 seconds (adjustable with internal trim pot)
  5. Spike Protection Modes: Line to neutral, neutral to ground, line to ground
  6. Spike Clamping Voltage: TVSS rating 400V peak, L-N, N-G, L-G (tested to UL 1449)
  7. Response time: One nanosecond
  8. Maximum surge current: 6,500 amps (8 x 20  $\mu$ s pulse)
  9. Maximum spike energy: zero joules per node, 240 joules total protection.
  10. Noise attenuation: Transverse: >50 dB, 1 to 120 MHz
  11. Common mode: 20 dB at 150 kHz, rising to >40 dB, 1 to 120 MHz
  12. Mechanical: Dimensions: 1.75" H x 19" W x 8" D.
  13. Weight: 6 lbs (2.7 kg).
  14. Construction: Steel chassis, zinc chromate plating; .125" brushed and black anodized aluminum front panel; 3 oz. copper double-sided glass epoxy printed circuit board; all IC's in sockets.
  15. Power consumption: Switch off: 6 watts. Switch on: 8.5 watts
  16. Safety Agency Listings: UL listed, CUL listed.
- C. Acceptable manufacturers include:
  1. Furman Sound Inc.
  2. ETA Systems

#### 2.45 WIRING & CONNECTORS

- A. All system wiring shall be plenum rated.
- B. Basic speaker cables shall be single twisted pair shielded cables, minimum of 14 gauge, stranded, tinned copper, aluminum-polyester shield, with stranded tinned copper drain wire. Cable shall be UL listed type 246A.
- C. For balance of A/V cables and connectors, reference one-line diagram in contract documents and provide appropriate cables and connectors to ensure a fully functional audio visual system.

- D. The video cabling shall be a Mini Super High Resolution Cables, reference one-line diagram in contract documents and provide appropriate cables and connectors to ensure a fully functional Video system.
- E. UTP cabling shall be at a minimum of the following requirements.
  - 1. Minimum Bend Radius: 4.5 inches.
  - 2. No. of Conductors: Eight insulated conductors
  - 3. Standard lengths: 1000 Ft.
  - 4. Shipping Weight: 21.8 lbs.
  - 5. Conductor Diameter: 12 AWG.
  - 6. Nom. DCR: 22.8 ohms pr 1k ft.
  - 7. Nominal Core Outside Diameter: 0.041
  - 8. Nom. Pair-to-Pair Skew: Group 1:1.5 ns/ 100 m
  - 9. Nominal Outside Diameter: 0.200 X 0.280 inches.
  - 10. Nominal Impedance: 100 ohms.
  - 11. Nominal Velocity of Propagation: 71%.
  - 12. Nominal Capacitance: 1pF/ft.
  - 13. Nominal Attenuation at 155Mhz: -8.8 dB/100ft.

#### 2.46 TRANSIENT VOLTAGE SURGE SUPPRESSION

- A. Transient voltage surge suppression devices shall be provided to protect both power strips in each rack and all equipment in each Lectern.
- B. Transient voltage surge suppression devices shall be an industrial-grade surge suppressor with EMI/RFI filtering.
- C. Transient voltage surge suppressors shall meet the technical requirements of SurgeX Professional AC Power Products.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. General: System components and appurtenances shall be installed in accordance with NFPA 70, manufacturer's instructions, and as shown. Necessary interconnections, services, and adjustments required for complete and operable audio visual systems shall be provided. Components shall be labeled in accordance with TIA/EIA 606. Penetrations in fire-rated construction shall be fire-stopped. A/V cables shall not be installed in the same raceway with AC power cables. Cables not installed in conduit or wire ways shall be properly secured and neat in appearance and, if installed in plenums or other spaces used for environmental air, shall comply with NFPA 70 requirements for this type of installation.
- B. Equipment Racks and Cabinets

1. Open frame equipment racks shall be bolted to the floor slab. Cable guides shall be bolted or screwed to racks. Racks shall be installed level.

C. Rack Mounted Equipment

1. Rack mounted equipment shall be securely fastened to racks by means of the manufacturer's recommended fasteners.

3.2 GROUNDING/BONDING

- A. Ground all equipment, racks, and Lecterns with AWG #6. Provide ground path to the building main electrical ground and bond within two feet to three feet of the ground connection for the main electrical panel. Communication ground system must be Meggar tested to 10 ohms or less. All wire used for ground applications must be no smaller than AWG #6.

3.3 TESTING AND CHECK-OUT

- A. Testing requirements apply to all equipment. Contractor to test each audio visual component as recommended by manufacturer. Test methods and test results shall be submitted to the owner prior to final inspection.
- B. Materials and documentation to be furnished under this specification are subject to inspections and tests. All components shall be terminated prior to testing. Equipment and systems will not be accepted until the required inspections and tests have been made, demonstrating that the audio visual systems conform to the specified requirements, and that the required equipment, systems, and documentation have been provided.

3.4 TRAINING

- A. The Contractor shall include in the base Contract all costs required to train owners operating and maintenance personnel in the use and maintenance of systems provided under this section of the Specifications. Training sessions shall be conducted by instructors certified in writing by the manufacturer of the specific system.
- B. Sessions shall be conducted for not less than four-hour periods during normal working hours, i.e., Monday through Friday, 8:00 AM to 5:00 PM. Training session schedules shall conform to the requirements of the owner; therefore, such schedules shall be submitted to owner for approval not less than two weeks prior to the training session. All training sessions shall be video-taped for future use. At Owner's discretion, provisions shall be made to allow up to two owner personnel to participate in final system check out of all systems.
- C. Videotapes shall be of professional quality for both video and audio and must be approved by the Owner/User. Provide two copies to Owner/User. Time to be included in base Contracts for specific systems shall be as follows:

1. Audio Visual Systems- 16 hours

3.5 AS-BUILT DRAWINGS AND/OR DOCUMENTATION:

- A. As-built drawings shall be provided noting the exact cable path and cable labeling information. Drawings in .DWG format shall be provided by the contractor. As-builts shall be submitted to the owner on formatted CD's, saved as .DXF or .DWG files. Redline hardcopies shall be provided as well. CAD generated as-built information shall be shown on a new layer named AS-BUILT.
  - 1. System Acceptance: Before the owner accepts the system, the contractor shall be required to walk-through the installation with the owner's representative and the design engineer to verify proper installation and operation.

END OF SECTION

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